

REMARKS

Overview of the Office Action

Claims 1-6 and 11-12 stand rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent 6,242,764 to Ohba (“Ohba”).

Claims 7-10 and 13 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Ohba in view of U.S. Patent 5,771,110 to Hirano (“Hirano”).

Status of the claims

Claims 1-3, 5-7, and 9-10 have been amended.

Claims 1-13 remain pending.

Summary of the Subject Matter Disclosed in the Specification

The following descriptive details are based on the specification. They are provided only for the convenience of the Examiner as part of the discussion presented herein, and are not intended to argue limitations which are unclaimed.

The specification discloses a method for depositing a material on a substrate wafer. The method includes the steps of: (a) providing the substrate wafer (1), which has a growth area (4) intended for a later material deposition; (b) affixing a thermal radiation absorption layer (2), which exhibits a good absorption of thermal radiation, on a rear side (5) of the substrate wafer (1) which faces away from the growth area (4); (c) heating the substrate wafer (1) to a deposition temperature; and (d) depositing a material (3) onto the growth area (4) of the substrate wafer (1) by an MOVPE method, wherein the thermal radiation absorption layer (2) is affixed to the substrate before the deposition of the material onto the growth area (4) of the substrate wafer (1);

wherein the substrate wafer (1) is heated by the thermal radiation absorption layer (2) during MOVPE (metal organic vapor phase epitaxy).

Descriptive Summary of Ohba

Ohba discloses a GaN-based compound semiconductor light-emitting element that includes an AlN buffer layer, a GaN lattice strain moderating layer, and an n-type AlGaN contact layer formed on the layer. Ohba discloses that an electrically conductive material is used for forming the substrate and an electrode is mounted to a back surface of the conductive substrate, with the result that the p-side electrode can be brought into contact with a heat dissipator.

Claims 1-6 and 11-12 are allowable over Ohba under 35 U.S.C. § 102(b)

With respect to claim 1, the Office Action states that Ohba teaches all of Applicants' recited elements. Applicants disagree.

Ohba fails to teach or suggest a method for depositing a material (3) on a substrate wafer (1), wherein the thermal radiation absorption layer (2) is affixed to the substrate before the deposition of the material onto the growth area (4) of the substrate wafer (1), and wherein the substrate wafer (1) is heated by the thermal radiation absorption layer (2) during MOVPE.

In response to Applicants' previous arguments, the Examiner cites the n-side electrode (522) (i.e., the AlTi layer of Fig. 6 of Ohba) of the fifth embodiment of Ohba as allegedly teaching Applicants' recited thermal absorption layer. The Examiner also cites the sixth embodiment of Ohba, where the substrate is put on a susceptor which acts as a heater during MOCVD, as teaching Applicants' recited thermal absorption layer. The Examiner further asserts that Ohba teaches that the thermal absorption layer is capable of being applied either before or

after construction of the device's growth area of the substrate wafer. The Examiner additionally states that he sees no reason why the technique of applying the thermal absorption layer before the deposition step is special with respect to Applicants' claimed process. Applicants submit that the Examiner has misinterpreted Ohba and failed to appreciate the advance of Applicants' claimed invention.

According to Applicants' recited invention, the thermal absorption layer, which can absorb the thermal radiation better than a substrate wafer alone, is affixed to the back side of the substrate wafer before the deposition of a material in order to improve heat input into the substrate wafer during MOVPE. Although a layer, which contains a metal, can principally serve as a thermal radiation absorption layer, in order for the layer to function as a thermal absorption layer the layer must be affixed before deposition. Otherwise, the layer cannot provide a thermal absorption function.

Nowhere in Ohba is it taught or suggested that the n-side electrode is or should be affixed to the substrate before the semiconductor material is deposited on the substrate and, therefore, that it might serve as a thermal radiation absorption layer. Moreover, as is known to those skilled in the art, the n- and p- side electrodes are typically applied to the semiconductor body after the semiconductor body has been produced. Thus, it can only be reasonably assumed that the n-side electrode (522) disclosed by Ohba is applied to the substrate (501) after depositing the semiconductor material and not before, as recited in Applicants' claim 1. The n-side electrode (522) of Ohba could not therefore serve as a thermal radiation absorption layer, as recited in Applicants' claim 1.

Further, although Ohba states that the p-side electrode can be brought into contact with a heat dissipator (see col. 9, lines 27-28 of Ohba), this alone cannot logically be viewed as

denoting or indicating or suggesting that the n-side electrode (522) in Ohba is applied to the substrate before the deposition of the semiconductor material. Ohba is concerned with producing a semiconductor light emitting element. As is known to those skilled in the art, a heat dissipator is typically not used during the construction of a semiconductor light emitting element, but is instead used after construction and during operation of the semiconductor light emitting element in order to cool the device. Thus, Ohba fails to teach or suggest “depositing a material on a substrate wafer, wherein the thermal radiation absorption layer is applied before the deposition of the material onto the growth area of the substrate wafer, and wherein the substrate wafer is heated by the thermal radiation absorption layer during MOVPE”, as is recited in Applicants’ claim 1.

Ohba discloses a MOCVD process in which an SiC substrate or sapphire substrate is put on a susceptor, which also acts as a heater (see col. 9, lines 51-53 of Ohba). However, as is known to those skilled in the art, during the MOCVD process, the substrate is placed by an external transfer device onto substrate supporting pins that extend through bore holes in the susceptor, which is located inside a reaction chamber of the MOCVD apparatus. Once the substrate is placed on the supporting pins, the external transfer device releases the substrate. The supporting pins thereafter retract and lower the substrate onto the susceptor. After material has been deposited onto the substrate, the supporting pins re-extend through the bore holes of the susceptor and lift the substrate off the susceptor. The external transfer device then removes the substrate from the reaction chamber. Thus, the substrate of Ohba is simply placed on the susceptor. The susceptor disclosed by Ohba is part of the MOCVD apparatus, and is not part of, or affixed to, the substrate.

The susceptor of Ohba is not therefore the same as or equivalent of Applicants' recited thermal radiation absorption layer, and Ohba thus fails to teach or suggest, "wherein the thermal radiation absorption layer is affixed to the substrate before the deposition of the material onto the growth area of the substrate wafer; and wherein the substrate wafer is heated by the thermal radiation absorption layer during MOVPE", as recited in Applicants' amended claim 1.

In view of the foregoing, Applicants submit that Ohba does not teach or suggest the subject matter recited in amended independent claim 1. Accordingly, independent claim 1 is deemed to be patentable over Ohba under 35 U.S.C. §102(b).

Dependent claims

Claims 2-6 and 11-12, which depend directly or indirectly from independent claim 1, incorporate all of the limitations of independent claim 1 and are, therefore, patentably distinct over Ohba for at least those reasons discussed above with respect to independent claim 1.

Claims 7-10 and 13 are patentable under 35 U.S.C. § 103(a)

With respect to claims 7-10 and 13, the Office Action states that the combination of Ohba and Hirano teaches all of Applicants' recited elements.

Ohba has been previously discussed, and does not teach or suggest the invention recited in Applicants' amended independent claim 1.

Because Ohba does not teach or suggest the subject matter recited in Applicants' amended independent claim 1, and because Hirano does not teach or suggest the elements of

claim 1 that Ohba is missing, the addition of Hirano does not remedy the non-obviousness of the claims.

Claims 7-10 and 13, which depend from independent claim 1, incorporate all of the limitations of independent claim 1 and are, therefore, patentably distinct over Ohba and Hirano for at least those reasons discussed with respect to independent claim 1.

Newly added claims 14 and 15

Claims 14 and 15 have been newly added. Support for claims 14 and 15 can be found in paragraph [0018] of Applicants' published specification.

Claims 14-15, which depend directly or indirectly from independent claim 1, incorporate all of the limitations of independent claim 1 and are, therefore, patentably distinct over Ohba for at least those reasons discussed with respect to independent claim 1.

Conclusion

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of all rejections, and allowance of all pending claims, in due course.

Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate an early resolution of any outstanding issues

Respectfully submitted,

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